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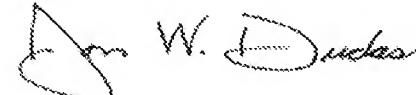
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122303

16085 U.S. PTO

PTO/SB/16 (08-03)

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53 (c).

EL 995078930 US

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 Additional inventors are being named on the 1 separately numbered sheets attached hereto**TITLE OF THE INVENTION (500 characters max)**Direct all correspondence to: **CORRESPONDENCE ADDRESS** Customer Number

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ENCLOSED APPLICATION PARTS (check all that apply)

<input checked="" type="checkbox"/> Specification Number of Pages	3	<input type="checkbox"/> CD(s), Number	_____
<input checked="" type="checkbox"/> Drawing(s) Number of Sheets	1	<input type="checkbox"/> Other (specify)	_____
<input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76			

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<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.	FILING FEE AMOUNT (\$)
<input type="checkbox"/> A check or money order is enclosed to cover the filing fees	
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

 No. Yes, the name of the U.S. Government agency and the Government contract number are: _____

[Page 1 of 2]

Respectfully submitted,
SIGNATURE

TYPED or PRINTED NAME

BRIAN J. CROMARTY

TELEPHONE

609 734 6804

Date

12/23/03

REGISTRATION NO.
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Docket Number:

PU030311

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Docket Number PU030311		
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Method and Apparatus for Changing Channels in a System Operating in a PVR Mode

The invention describes a method and apparatus for incorporating an AVHDD (Audio Video Hard Disk Drive) with an IEEE-1394-capable HDTV to create a pseudo-PVR mode, and the rules for handling various aspect of the pseudo-PVR mode operation, including, channel changing and the variables of PID filtering, analog and digital channels, channel changes via direct entry, channel changes via CH+/-, temporary time-shift buffer flushes, changing major channels, changing minor channels (i.e., subchannels), etc.

It is highly desirable to be able to record a digital-TV broadcast because of its crisp and flawless picture, widescreen aspect ratio, and outstanding sound. However, recording digital-TV (ATSC, QAM) is not possible using a normal VCR since a normal VCR has a built-in analog-TV tuner, but not a built-in digital-TV tuner. An AVHDD (Audio Video Hard Disk Drive) is a solid-state digital recording device ideal for recording digital-TV broadcasts. Because of its capability to capture and effortlessly manipulate digital video (for example, to rewind/forward at different speeds, pause, jump from video location to video location), an AVHDD is also an ideal device for using as a PVR (Personal Video Recorder, i.e., a device that not only records favorite shows but continuously creates a time-shift buffer which can be manipulated at any time to pause TV, replay it, skip video, etc.).

The challenges in constructing an HDTV-with-AVHDD system into a PVR include:

- Since the HDTV does not have an MPEG encoder, the HDTV's 1394 output can output digital-TV programs but not analog-TV programs: How to handle channel changing to analog channels in PVR mode?
- A digital-TV channel can have multiple minor or "sub" channels: how to handle channel changes between minor and major channels?
- What should be done with the temporary time-shift buffer on channel changes, especially when PID filtering is enabled or disabled?

The inventors are unaware of other attempts to create a PVR system from an IEEE-1394-capable HDTV and an AVHDD, and teachings as to how channel changes would be handled if other such systems existed. In the previous generation of RCA HDTV (i.e., DM2CR, ATC311CR), the only way for the user to create a "PVR" mode was to start a "permanent" recording first by pressing RECORD button, then the user could manipulate the video from within that permanent recording. A temporary time-shift buffer was not part of DM2CR.

In the RCA ATC32x HDTV (which has a 1394 output, wherein an optional Audio Video Hard Disk Drive (AVHDD) may be attached via 1394), the HDTV records the currently-tuned digital-TV program onto the AVHDD so as to create a "continuous record time-shift buffer" like a Personal Video Recorder (PVR).

Pressing a “transport” key while tuned to a digital channel will enable PVR mode (as previously described) where the TV switches from its tuner to the AVHDD so that the user can use the trick-mode capabilities of the AVHDD like a PVR (e.g., PAUSE, slow motion, reverse, forward, instant replay, etc.). Pressing a “transport” key while tuned to an analog channel will not enable PVR mode since analog channels cannot be encoded to digital by the TV for recording to the AVHDD (however, if the TV had an MPEG encoder, then pressing a transport key would be allowed to initiate PVR mode for analog channels).

Certain inventive rules were created to handle various user actions and situations while in this pseudo-PVR mode of an HDTV-with-AVHDD which now follow:

What follows is an example of how channel tuning is handled in PVR mode: When watching Live TV of a digital-TV program, the TV is in continuous buffer mode (i.e., the tuner’s video is being sent via 1394 to the AVHDD which is continuously recording it) > user presses a transport key (e.g., REVERSE, FORWARD, PAUSE, etc) > TV switches to the default recording 1394 device (e.g., AVHDD) and begins PVR mode > user can do other transport commands in PVR mode > the CH+/- (Channel up, Channel down) buttons go through the subchannels on the current stream (i.e., on the current major channel) > at last subchannel of a given major channel, pressing CH+/- will go to next major channel while staying on that 1394 input > tuning to the next major channel will flush the temporary buffer.

When in PVR mode, CH+/- only tunes the next digital subchannel or the next digital major channel. Analog channels are not tuned (i.e., they’re skipped) when in PVR mode when the user presses CH+/- buttons.

Regardless of whether the TV is or is not applying PID filtering to the 1394 output stream, CH+/- will always tune to the next subchannel. (PID filtering is the act of stripping out the video, audio, and auxiliary information from subchannels other than the currently-tuned one.)

When in PVR mode and PID filtering is enabled, changing to the next major channel or to the next subchannel will flush (i.e., “erase”, “clear”) the temporary buffer.

When in PVR mode and PID filtering is NOT enabled, changing the minor channel does NOT flush the temporary buffer. This way, the user can flip back to that subchannel and still view that subchannels’ content.

If watching content from the TV tuner while in PVR mode and the user directly enters an analog channel number with the number keypad on the remote, then the TV

exits PVR mode (i.e., stops tuning to the default 1394 recording device) and displays the requested analog channel from the TV tuner.

If watching either TV tuner or 1394 device like cable box, TV is in PVR mode, and the user directly enters a digital channel number with the number keypad on the remote, then the TV stays in PVR mode and displays the requested digital channel from the TV's tuner (and buffers that new channel).

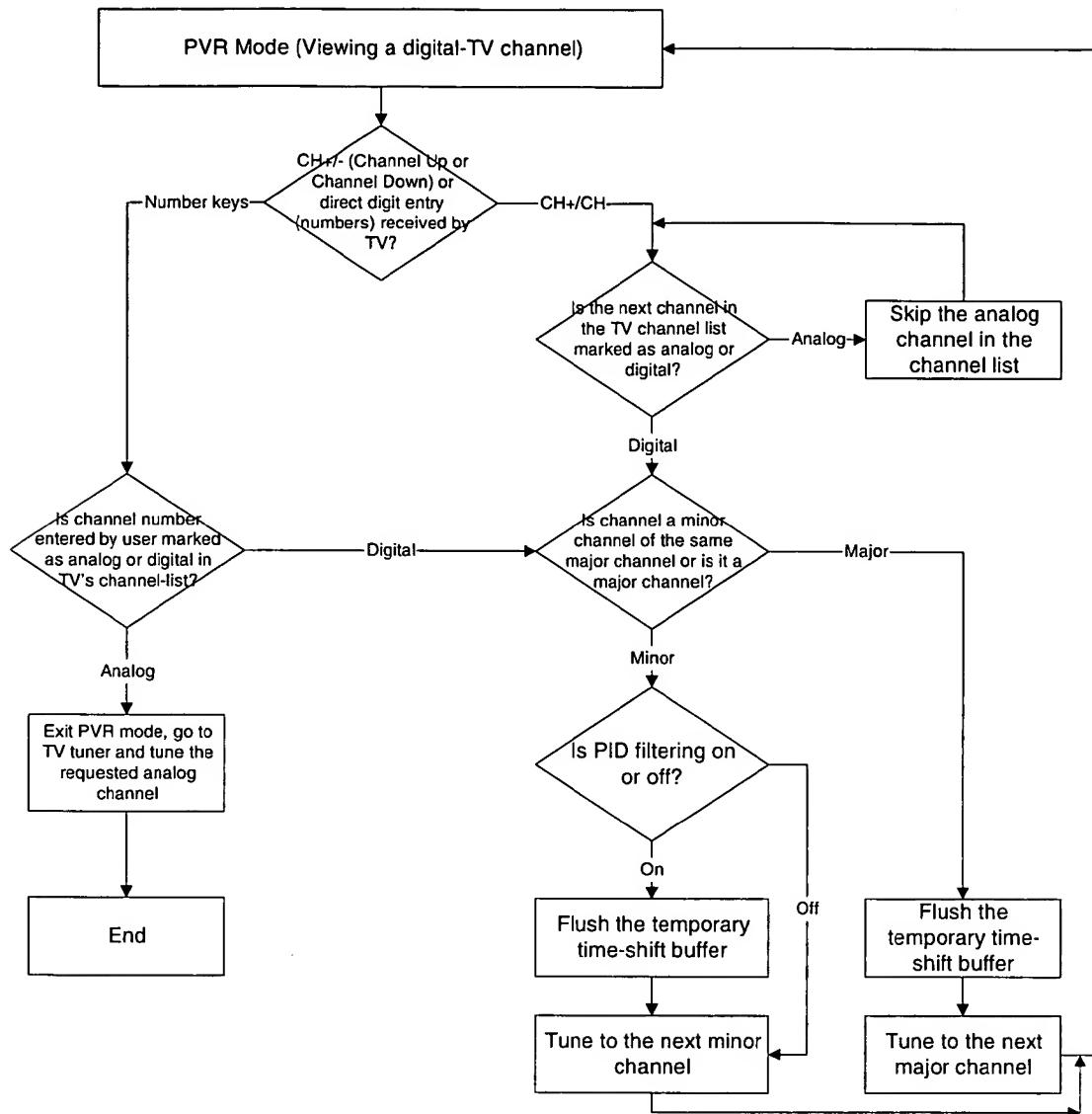


Figure 1: Digital Channel Change Method for PVR Mode

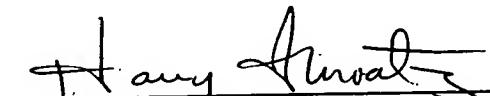
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